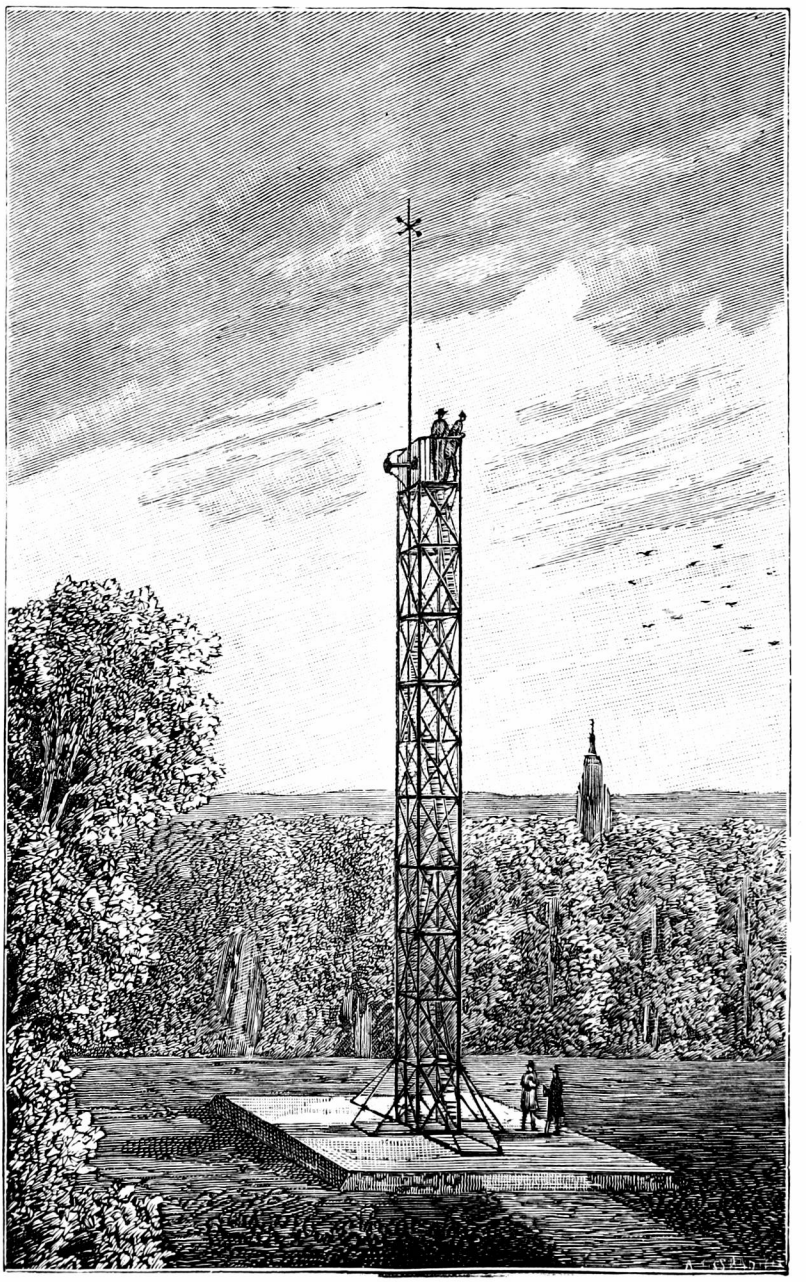

ANEMOMETER &c., TOWER AT M. HERVÉ-MANGON'S OBSERVATORY, BRÉCOURT SAINTE-MARIE-DU-MONT, MANCHE, FRANCE.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

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M. HERVÉ-MANGON'S IRON TOWER.

AFTER a life-long devotion to the application of Science to Agriculture, after years spent in the study of the influence upon land of irrigation and drainage, in which the Meteorological, the Engineering, the Chemical, and the Agricultural aspects were considered with equal care, we rejoice to see the Past President of the *Société Météorologique de France*, the Chairman of the French Meteorological Council put in what every one must admit to be his proper place, viz., that of (what we so much need in England) Minister for Agriculture.

But M. Hervé-Mangon is not one to let his duties as a statesman obliterate his love for Science; and we are glad not merely to lay before our readers the representation and description of one of his latest efforts on behalf of Meteorology, but also to add that at no remote period we have reason to hope for a useful contribution to Meteorological literature.

At present we have to deal solely with the Iron Tower, for the engraving of which we are indebted to the inventor's kindness.

And first, let us consider the need of such an edifice. Probably no one ever climbed a lofty tower without experiencing, on reaching the summit, a sensation of lightness and freshness, although few have taken the trouble to think out the causes of that sensation. The chief cause is undoubtedly the increased velocity of the air. It needs no scientific skill to perceive that the fluid ocean in which we live, must be retarded by friction, even where it passes over (say) a cornfield; while those who are familiar with what is known as skin-resistance will realize that even over a calm sea the retardation of the lower strata of an air current is decidedly important. When we pass to land, with hills, and trees, and houses, the resistance becomes very great, and the opportunities for obtaining strictly comparable records of the velocity of the wind become very rare. Here meteorologists come in and hitherto with the result of making matters worse instead of better, for with an utter disregard of common sense, they have hardly ever mounted two anemometers alike, either as regards the height above the ground at, or the shape of the edifice upon, which they are supported. We do not here go into the

subject, but append in a foot-note some references which anyone who thinks our remarks too severe had, before replying to them, better consult.*

M. Hervé-Mangon, being an engineer as well as a scientific man, has so designed his tower as to attain several separate objects. It is made almost wholly of angle-iron bolted together, and therefore all, except the base, is easily moved: in proof of which it may be mentioned that the tower represented in the engraving, which is 50 feet high, was made in the suburbs of Paris, sent to M. Hervé-Mangon's country seat, and erected, without any scaffolding or hoists, in three days by three men.

Angle-iron is used as giving the maximum of strength combined with a large surface, the object being to ensure that thermometric observations shall not be vitiated by the influence of the temperature of the mass of the tower. It is painted white, and it is found that even in full sunshine the iron is not 1° F. hotter than the surrounding air.

The provision of internal ladders is extremely convenient, and infinitely to be preferred to the "bear's pole" up which (some twenty years since) we used to climb morning and night in order to obtain a set of thermometric readings 20 feet above the soil, and clear of the influence of buildings. Far safer, too, than for example, the rain gauge masts at Calne, Castleton Moor, and Strathfield Turgiss, the anemometer mast at the Montsouris Observatory, or others, from some one of which a fatal accident is certain to occur.

This first tower is only 50ft. high, but it will be evident from the drawing that it is merely a question of heavier iron and therefore rather greater cost, to double or quadruple that height. The foundation is very simple—an excavation of two feet, with the first three feet of the tower set in a large square bed of concrete three feet thick.

The anemometer is a Robinson cup with M. Hervé-Mangon's arrangement for electrically recording its indications, which bye-the-bye it does in the laboratory 150 yards distant.

The mast slides in a tube by the side of the tower, and although this mast is nearly 50ft. long and weighs six cwt., it is so arranged that one person can, by means of a windlass at the top of the tower, easily raise or lower it in a few minutes.

When meteorologists arouse themselves to the fact that there are matters of more importance than determining the mean pressure at Shanghai true to 0·001 in., when they get out of the ruts into which so many of them drive, we shall see the great question of local

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*(1) Stevenson—Journal Scot. Met. Soc. Vol. V., p. 348.
(2) Reports of Court of Inquiry.....fall of Tay Bridge. London, 1880.
(3) Bender, Gaudard, Symons, Baker, Seyrig, Rogers Field and others, Min. Inst. Civil Engineers, Vol. LXIX., 1882.
(4) Archibald—*Nature*, Nov. 20, 1884, and Rep. Brit. Ass. Montreal, 1884, p. 639.

influence investigated; we or our successors shall see towers like this rendered useful alike to meteorology and to hygiene, by the determination of the influence of the earth's surface not merely on wind force, or on temperature, but upon the humidity and purity of the air by researches on the hygrometry and by analysis of the air at various heights, for both of which purposes this tower would be as perfectly suitable as it is for the subjects for which it was specially designed.

Dr. Borius.

We learn with great regret that Dr. Borius, several of whose works upon the climate of Senegal, and also upon that of Brest, have been brought before our readers, has at last fallen a victim to the climate of Tonkin. On the outbreak of hostilities he was selected by the French Government for service with the expedition, because of his medical and meteorological knowledge, and because his previous experience on the West Coast of Africa would, of course, be most useful. He was provided, by the Bureau Central Météorologique, with a complete set of instruments, and for a considerable period sent home very valuable records, but at last his useful career is over; he has fallen, like so many others, at the post of duty. Can one wish for more?

ROYAL METEOROLOGICAL SOCIETY.

The usual monthly meeting of this Society was held on Wednesday evening, the 20th inst., Mr. R. H. Scott, F.R.S., President, in the chair. Dr. H. Dobell, and Mr. J. N. Longden were elected Fellows of the Society.

The following papers were read:—1, "The Temperature Zones of the Earth considered in relation to the duration of the hot, temperate and cold periods, and to the effect of temperature upon the organic world," by Dr. W. Koppen, Hon.Mem.R.Met.Soc. 2, "Velocities of Winds and their Measurement," by Lieut.-Col. H. S. Knight, F.R.Met.Soc. The author, after describing the various ways of ascertaining the direction and velocity of the wind, makes several suggestions for the improvement of Robinson's anemometer. 3, "On the Equivalent of Beaufort's Scale in Absolute Velocity of Wind," by Dr. W. Koppen, Hon.Mem.R.Met.Soc. The author refers to Mr. C. Harding's paper read before the Society in December last on the anomalies in the various wind velocities given by different authors as equivalents for the numbers in Beaufort's scale; and, as illustrating the point, calls special attention to the want of agreement between the velocities obtained by Mr. Scott and those subsequently obtained by Dr. Sprung, and confirmed by himself. 4, "Note on a Peculiar Form of Auroral Cloud seen in Northamptonshire, March 1st, 1885," by the Rev. James Davis.

ON RELATIVE HUMIDITY AND THE DRYNESS OF THE AIR.

To the Editor of the Meteorological Magazine.

SIR,—Mr. Dines, in the April number of the *Meteorological Magazine* maintains that all deductions from the psychrometer are open to doubt, and I affirm that so also are all deductions from condensing hygrometers, and that the former is a more simple and manageable instrument than are any of the latter. Psychrometers are comparable with each other, hygrometers are not, or there would not be so many varieties of them. For my part, I prefer the deductions from psychrometers to those from hygrometers. A condensing hygrometer, whether Daniell's, Regnault's, Dines's, or Alluard's, has the thermometer's bulb immersed in a cooling medium, and one surface of the dew plate is also in contact with the cooling medium, but the surface upon which the dew is formed is cooled by conduction, and is exposed to the air which may be many degrees, 50 or 60, or more, warmer. In these circumstances, when dew appears, the thermometer must be colder than the outside of the plate. When the dew disappears, the thermometer cannot have received the same addition of heat as the outer surface of the plate. These are the results of conduction, and in Dines' hygrometer the plate is glass, a bad conducting substance.

Mr. Dines states that on April 20th, while the psychrometer "remained remarkably steady," his hygrometer was "most erratic." Why? Great differences between the observed and computed dew-points occur with great dryness of the air. There is then great cold around the thermometer's bulb, while the outside of the plate where the dew is looked for, is exposed to great heat, and this is especially the case if the observer is short-sighted, and has to approach close to the instrument. The plate does not in fact cool so low as the thermometer, which accordingly gives a temperature much lower than the dew-point. The hygrometer never can give the correct dew-point when the air is very dry. Even supposing Mr. Dines' observations to be correct, before they can be used to test the formula for the psychrometer, the atmospheric pressure must be given. If the psychrometer is not fitted to give the dew-point temperature, and the relative humidity, for what is it fitted?—Yours faithfully,

R. STRACHAN.

11, Offord Road, N., May 25th, 1885.

[We strongly object to the name psychrometer, Ψυχρός Μέτρον, cold measurer), being given to the dry and wet bulb or to any hygrometer; but in the above letter we think that its use secures brevity and prevents confusion. The dry and wet bulb thermometer ought to be called Boeckmann's Hygrometer, but not one person in a thousand would recognise it under that name.—ED.]

THE FROZEN GROUND AT YAKOUTSK.*

Among the "Scraps" on page 26 will be found some remarks upon the above subject. We have since been favoured with the following letter from the highest authority upon underground temperature, Prof. Everett, F.R.S., the Secretary of the Committee of the British Association studying that subject, and editor of its sixteen consecutive reports :—

SIR,—I have looked up the reference in my reports respecting the Yakoutsk Well, referred to at page 26 of your March number.

General Helmersen is responsible for the calculation (see my fourth report, A), and he is probably right. You will notice that there is an extraordinary difference between the temperature at 100 feet deep and the mean temp. of Yakoutsk. Helmersen founds his calculation on the former, you found yours on the latter; hence the discrepancy in your results.

Leaving the air temp. out of the question, the data seem to stand thus :—

100 ft.	.....	—5·2 R.	.....	= 20·3 F.
540 ft.	.....	—1·4	.....	= 28·8

Whence is computed—

706 ft.	.. ...	0·0	.....	= 32·0

The gradient being 1°R in 117 ft., or 1°F in 52 ft.—Yours truly,

J. D. EVERETT.

Lennoxvale. Belfast, April 5th, 1885.

In order to put our readers in possession of all the details known to us or referred to in the British Association Report, we add the following paragraphs :—

A.—EXCERPT from General Helmersen's letter to Prof. Everett in 4th Report of Committee on Underground Temperature :—

"You are doubtless aware of the existence of a series of observations on the temperature of the soil at the bottom of a well which was sunk in the town of Yakoutsk in Eastern Siberia. This well has shown us that the soil of Siberia, at least in this part of its great extent, is frozen to a depth of 540 English feet. The mean temperature of Yakoutsk is −8°·2 R. = 13°·6 F. At the depth of 100 feet the temperature of the soil was found to be—5°·2 R. = 20°·3 F. From

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* We ought perhaps to apologise for the spelling here adopted, but the precise representation of the Russian name is not easy, as there are many ways of spelling it. We arrange a few in the alphabetical order, with the authority for each .—

IAKOUTSK.—Atlas of Useful Knowledge Society.
IAKUTSK.—Dr. Wild of St. Petersburgh.
IAKUTZK.—Prof. Dove.
JAKOUZK.—Dr. Erman.
JAKUTZK.—Prof. Dove.
JAKUZK.—Berghaus.
YAKOUTSK.—General Helmersen, of St. Petersburgh, and Keith Johnston.
YAKUTSK.—Blackie, Dr. Hann, and Keith Johnston.

this depth to the bottom the temperature increased at the rate of 1° R for every 117 feet, = 1° F in 52 feet; whence it would follow that the soil at Yakoutsk is frozen to the depth of about 700 feet."

EXCERPT from the Fourth Report of Committee on Underground Temperature.

An account of the Yakoutsk well is given in "Comptes Rendus," tome vi., 1838 (B), in an extract from a letter by Erman (fils), who visited Yakoutsk when the well had attained a depth of 50 feet. He gives the temperature at this depth from his own observations, and the temperatures at 77, 119, and 382 feet from the subsequent observations of the merchant to whom the well belonged. His figures differ very materially from those given above; but it may fairly be presumed that General Helmersen's account is the more accurate.

B.—COMPTE RENDU DES SEANCES DE L'ACADEMIE DES SCIENCES, 16th Avril, 1838, p. 501.—*Extract from a letter from* M. ERMAN *fils to* M. ARAGO, *respecting the temperature of the earth in* SIBERIA.

ABSTRACT.

IN my Journal I have epitomized the details of the climate of Yakoustk. A merchant there, M. Schergin, had, in the hope of reaching water, caused a well to be sunk, which at the time of my visit was 50 English feet deep, but I found the temperature constantly − 6° R [= 18°·5 F.], therefore the temperature of the air there cannot be greater, though the latitude is only 62°. Moreover, this agrees closely with the air temperatures as recorded by thermometers which I have myself verified. Hence it follows that water can only be reached when the natural rise of temperature amounts to 6° R [= 13½° F.]; this according to observations in other parts of Europe, and to my own in the Ural mountains, is 1° R for 90 or 100 French feet [= 1° F. in 42 to 47 ft.]. I should, therefore, not expect to reach 32° at Yakoustk at less than 500 to 600 French feet [533 to 640 English feet].

The observations made by M. Schergin since my visit, and during the digging of the well to 400 English feet, have thoroughly confirmed my previous remarks, having given—

77	English feet	− 5°·5 R.	= 19°·6 F.
119	,, ,,	− 4 ·0	= 23 ·0
382	,, ,,	− 0 ·5	= 30 ·9

But they indicate a rise of 1° R for 60 English feet [= 1° F for 26 English feet !] which is much more rapid than usual.

SUMMARY OF THE FACTS.

Mean temp. of air at Yakoutsk	13°·6 F.
Temp. according to Erman at 50 ft. ...	18 ·5
,, ,, ,, Schergin at 77 ft. ...	19 ·6
,, ,, ,, Helmersen at 100 ft....	20 ·3
,, ,, ,, Schergin at 119 ft. ...	23 ·0
,, ,, ,, ,, at 382 ft. ...	30 ·9
,, ,, ,, Everett at 540 ft. ...	28 ·8

From this it is evident that 32° is likely to be reached at some depth not exceeding 700 or 800 ft., but it would be very interesting to have the *details* upon which General Helmersen based his statement that "From this depth (100 ft.) to the bottom (540 ft.) the temperature increased at the rate of 1° F. in 52 ft."

We regret to see that the death of General Helmersen is just announced.

FROST OF 1739–40.

To the Editor of the Meteorological Magazine.

SIR,—With reference to Mr. Coventry's letter, I shall be very much obliged to any reader of the *Meteorological Magazine* who will inform me if any records of *thermometrical observations* taken during this frost exist; and, if so, by whom? and where were they kept?

I am Sir, yours truly,

G. T. GWILLIAM.

Bayswater, May 22nd.

[We have not time to make a careful search, but suggest that Mr. Gwilliam should look in the *Philosophical Transactions* for observations made at Oundle, Northamptonshire, by Mr. Lynne, and at Lyndon, Rutland, by Mr. Barker. We reprint for general use parts of the remarks upon December, 1739, and January, 1740, given by Dr. Huxham*, which will indicate the severity of the frost even at so comparatively mild a place as Plymouth.

DECEMBER.

Full Moon the 4th. New Moon the 19th.

The Weather in this Month was altogether surprising; In the Beginning of it we had a north-east Wind and a severe Frost, presently a rainy and turbulent south Wind; in a very short Time after a south-westerly, and a great deal of Rain, the Barometer nevertheless rising. The 14th and 15th the Wind was north-west; the 16th, north-east, and a Return of the Frost; the 19th and 20th, a violent south-east; on the 21st, again, a stormy south-west; from that an easterly to the 28th, a cold north-east Wind intervening, the 25th and 27th; then a most severe Storm from the East, with an exceeding severe Frost, and a constant exceeding small Snow to the very End. In an Instant a most piercing Cold froze up every Thing, both within Doors and without; nay, the very strongest Kinds of Wine were frozen; indeed whatever was exposed to the air instantly turned into Ice. People even shivered by the largest Fire's-Side, nor could keep themselves warm in their very Beds; indeed so very greatly were we benumbed by the excessive Cold, that we seemed scarcely alive. A most violent storm at the Close of *December* carried off a great Number of Birds, both small and great, from the Land, and drove them to a vast Distance from Shore, which, being quite tired with their long Flight, betook themselves to those Ships which were in the Midst of the Ocean, and were easily taken by the Sailors: "Mirum utiquè Genus aucupii?"—Nay, in the Beginning of the *January* following, I myself accidentally going on Board his Majesty's Ship,

* Observations on the air and epidemic diseases from . . 1738 to . . 1748 by J. Huxham, M.D., F.R.S. Vol. ii. 8vo. London. 1767.

the *Weymouth* to see the Earl of *Deloraine*, who then lay sick, saw a Pie made of small birds, which the Sailors in their Return from *Lisbon* to our Port, had taken far, and far enough, from any Land.

Dig. Dec.
Rain 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 20. 21. 22. 23. 24. = 4·102.

Much Rain the 21st, 22d, and 23d, altho' the Barometer was at 30·1; besides we had a very violent south-west Wind; but the Air itself was exceeding thick and moist, an immense Quantity of Vapours being dispersed all over the Atmosphere. I was incapable of exactly estimating the Quantity of Snow which fell, being by the Impetuosity of the Wind blown out of the Receiver.

Greatest Height of ☿	16,	30·2, N.E. 1.	Mean Height
Least ———————	4,	29·1. S.S.W. 3x.	29·8.
Coldest Day in the Memory of Man,...	31,	90, E.N.E. 4x.	Mean Height
Warmest——————————...	10,	52, S.W. b W. 3x.	$61\frac{26}{28}$

Some miliary and nervous Fevers, the Small-pox here and there, Quinsies and Opthalmies Common; Coughs, Rheumatisms, Pleurisies, and Peripneumonies, frequent.

JANUARY.

Full Moon the 2d. New Moon the 17th.

The Severity of the Cold still continued, such, indeed, as was never known in this Country. Altho' on 1st Day of the Month there was a very great thaw, and a Fall of Rain, nevertheless the north-easterly Wind and a most sharp Frost instantly returned, which lasted to the very End of the Month; and altho', by the Heat of the Sun, all things were thawed by Day, yet by Night they were bound up by a most rigid Frost. The Atmosphere was generally very thick, and appeared as if covered over with Smoak; but, between the 10th and 17th, exceeding thin. The coldest Days were the 11th, 15th, 16th, 17th, 18th, 26th, 27th, 28th; nay, so severe was the Frost which now prevailed, that all Kinds of Wine, being exposed out of Doors, were immediately turned into Ice; nay, the very Salt-water upon the Shores was so, a Thing this which very seldom happens in these Parts. Innumberable Trees and Shrubs were cut off by the Cold, and even the very hardy Furzes themselves; indeed, you could scarce see a green Herb. A vast Number of Sea Birds flew hither, and Numbers from Foreign Countries, which had hever been seen here before.

Dig. Dec.
Rain 1. 2. 9. ——— Snow and Hail 8. 9. =0·416.

I could not perceive any northern Lights all this Month, altho' the Wind was constantly northerly.

Greatest Height of ☿	14,	30·4, E.N.E. 2.	Mean Height
Least ———————	1,	29·1, S.W. 2.	$30·1\frac{14}{31}$
Coldest Day.....	26,	84, N.N.E. 1	Mean Height
Warmest —.....	31,	69, S.E. b E. 3x.	$75\frac{11}{31}$

Some explanation of the above temperatures is needed, as otherwise the entry of "90°, Coldest Day in the Memory of Man," would be puzzling. Dr. Huxham states that he used a thermometer graduated according to "Hauksbee's construction, fixed in a proper room," and on another page he says that his observations are comparable with the well-known series made in Edinburgh, 1731-35, where the thermometer was in a perforated box outside a north window. We think that Hauksbee's scale was that called by Martine the "Royal Society" scale; if so, Dr. Huxham's thermometer was a very bad copy. His max. temperature on a very warm day in July 1738

was 17, and 17° Royal Society is supposed to equal 82° Fahrenheit which would do very well; but he makes the mean temp. of Plymouth about 45 Royal Society, = 59° F., which is far too high. And lastly, his "Coldest Day in the Memory of Man," with 90° Royal Society, would give about 23° F, which is nothing like cold enough to correspond with his description of the effects. In fact it is perfectly evident that M. Wargentin was quite right when he wrote* respecting Hauksbee's thermometers, "Ces thermomètres ne valent absolument rien."]

ON THE MEASUREMENT OF THE ALTITUDE AND MOVEMENT OF CLOUDS.†

FOR the Swedish Arctic Expedition some special theodolites were constructed designed for the rapid determination of the position of prominent auroral phenomena. These instruments would evidently answer equally well for determining the position of clouds. The Academy of Sciences of Stockholm caused others to be made and placed, two of them at the disposal of the authors; also two telephones and the needful wire; the instruments were erected, one at the Observatory at Upsala, and the other about a quarter of a mile away. The observers being able to converse readily, the observations had a great advantage over all previous attempts. The present paper is rather descriptive of the instruments and of the modes of calculating than of the phenomena observed, but the facts seem to be extremely interesting and instructive. The base of a quarter of a mile proved too short, having regard to the altitudes to be measured, and this year they hope to resume their measurements with a longer one.

ON THE CLIMATE OF THE GOLD COAST.‡

NOT long since we were indebted to the Basel Missionaries for an extremely important and useful map of the portion of Africa in which they are working. In the little work now before us Dr. Riggenbach does several useful things: he epitomizes the meteorological work done on the Gold Coast, he gives us the results of observations made by Dr. Mähly, during his journey to, and also at, the Mission stations in the interior, he gives first attempts at diagrams of the daily curve of temperature, and of the barometric fluctuation from hourly observations between 9 a.m. and 10 p.m., discusses at some length the nature of the Harmattan, &c. In a historical intro-

* *Mém de l'Acad. de Suéde.* Tome xi. p. 178.

† *Mesures des Hauteurs et des Mouvements des Nuages,* par N. EKHOLM e K. L. HAGSTRÖM. Nova Acta Reg. Soc. Sc. Upsal. Upsal, Berling, 1885.

‡ Zum Klima der Goldküste; Von A. Riggenbach. Aus den Verhandlungen der Naturforschenden Gesellschaft in Basel. VII. Theil, 3 Heft. Basel: J. G. Baur, 1885.

duction Dr. Riggenbach gives a very useful list of observers and authors who have contributed to our knowledge of the district—a list which appears to us perfect, and which starts with Isert, in 1783, and ends with Mähly, in 1884.

The observations are terribly fragmentary, but Dr. Riggenbach recognizes the fact, and has shown thorough skill in turning them to the best account.

We cannot pretend to epitomize the whole paper, but we jot down some facts.

The highest temperatures seem to be at Christiansborg, which is almost at the level of the sea. The daily temperature curve for that station reaches its max. at 1 p.m., while at the inland stations, such as Abetifi (lat. 6°50′ N., lon. 0°43′ W., altitude 2,198 feet), it does not reach it till 2.30 p.m., and on fine days not till 3 p.m.

The following are approximate mean annual values :—

	Latitude.	Long.	Altitude.	Temp.	Rain.
	° ′	° ′	ft.	°	in.
Christiansborg.....	5 32 N.	0 10 W.	49	80·5	22·64
Elmina	5 3	1 20	...	79·3	30·79
Aburi	5 51	0 9	1542	73·4	41·68
Odumase	6 8	0 0	361	77·0	...
Abetifi	6 50	0 43	2198	72·0 ?	42·00?

THE "STAMFORD MERCURY."

To the Editor of the Meteorological Magazine.

SIR,—I learn that Mr. Parnham took meteorological observations daily while at Ufford, 1738—1764 (died 1764) and that a digest of them was published "in one of our newspapers of last year" as Jones writes in the summer of 1764. It is either this digest, or the newspaper of 1763 containing it, that I am anxious to see. I find that there are files of the *Stamford Mercury* at the Stamford Institution as far back as 1799, and at the British Museum, I am informed, as far back only as 1826. The first *Stamford Mercury* was printed by Thompson & Bailey, in St. Martin's, Stamford, about 1712. The first newspaper published in England, was dated July, 23, 1588; it was designed by the Lord Treasurer Burghley, to answer the same purpose as the present *London Gazette*.—I am, Sir, yours faithfully,

FRED. COVENTRY.

Ketton Hall, Stamford, June 2nd, 1885.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, NOV., 1884

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Maximum. Date.	Minimum. Temp.	Minimum. Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	TotalRain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0–100	°	°	inches		
England, London	60·2	7	25·3	25	48·3	37·3	38·4	85	84·6	21·4	1·92	12	6·7
Malta	71·6	5	49·2	22	66·5	56·8	51·9	75	118·2	44·0	5·24	12	4·8
Mauritius	83·6	21	63·7	23	80·4	68·8	64·0	73	134·7	54·4	2·21	9	4·7
Calcutta	85·3	2	54·8	29	79·7	62·1	60·2	73	144·7	39·9	0·01	1	2·4
Bombay	88·7	6	66·6	19	86·3	71·4	66·8	67	144·7	53·3	0·60	1	1·6
Ceylon, Colombo	87·2	20	71·0	25†	85·2	73·2	70·3	74	145·0	59·0	17·73	14	6·0
Melbourne	92·9	20	41·7	9	70·0	51·0	48·6	68	151·5	32·7	3·11	12	6·3
Adelaide	94·0	20	46·0	30	76·9	55·2	46·3	48	155·0	32·2	0·37	8	4·3
Wellington	67·3	3	40·8	7	60·5	47·7	...	...	143·0	35·0	4·28	13	...
Auckland	70·5	22	45·0	11‡	64·8	51·5	48·4	71	139·0	40·0	2·08	13	6·9
Jamaica, Kingston	90·1	4	67·6	17	87·9	71·2	71·1	81	...	63·0	1·46	...	4·8
Barbados	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	54·1	10	10·7	27	40·5	27·3	29·8	81	106·2	4·5	2·31	13	7·1
New Brunswick, Fredericton	50·3	5	8·7	19	39·4	23·3	26·0	79	...	...	4·40	14	6·5
Manitoba, Winnipeg	49·2	13	-25·1	23	26·0	9·6	19·6	86	...	...	0·83	8	6·5
British Columbia, Victoria	58·0	7	27·0	22	...	...	...	...	...	..	1·60	11	...

* And 22. † And 27. ‡ And 12.

REMARKS, NOVEMBER, 1884.

MALTA.—Mean temp., 60°·6 ; mean hourly velocity of wind, 9·3 miles; TSS on three days, H on 1. J. SCOLES.

Mauritius.—Rainfall ·82 in. above, and temp. 0°·6 below average; mean hourly velocity of wind, 0·6 mile below average ; extremes 27·9 miles on 7th, and 2·1 miles on 14th, prevailing direction S.E. by E., to E. by N. L on 6th. C. MELDRUM, F.R.S.

CEYLON.—TSS on 4 days, T on 1, L on 3. F. C. H. CLARKE, Major, R.A.

Melbourne.—Mean. temp., 0°·7 below average, rainfall ·67 in., and temp. of dew point, humidity, amount of cloud, and pressure slightly above their respective averages. Prevailing winds S. and S.W., strong on 8 days; TS on 6th; L on 12th ; lunar halos on 2 days. R. L. J. ELLERY, F.R.S.

Adelaide.—As a whole, fine and pleasant, rainfall only about one-third of the average ; mean temp. slightly below, and pressure considerably above the average; amount of cloud less than usual ; TSS on 2 days. C. TODD.

Wellington.—Fine till 4th, when a N.W. gale blew at night, followed by showery, unpleasant weather till 12th (2·33 in. of R on 7th) ; from 12th to 21st, finer weather, though unsettled and changeable ; remainder of the month generally showery and squally ; prevailing wind, N.W. ; mean temp (54°·1), 2°·7 below average ; rainfall slightly below, and pressure slightly above average. R. B. GORE.

Auckland.—A cold, though fine month ; rainfall considerably below, and pressure slightly above their respective averages. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL, MAY, 1885.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	...	XI.	Rhayader, Nantgwillt..	4·51
,,	Margate, Birchington...	1·90	,,	Carno, Tybrith	3·73
,,	Littlehampton	2·74	,,	Corwen, Rhug	2·20
,,	Hailsham	2·97	,,	Port Madoc	2·09
,,	I. of W., St. Lawrence.	2·33	,,	I. of Man, Douglas	2·18
,,	Alton, Ashdell.....	4·92	XII.	Stoneykirk, Ardwell Ho.	2·10
III.	Winslow, Addington ...	2·87	,,	Melrose, Abbey Gate...	3·72
,,	Oxford, Magdalen Col...	2·03	XIII.	N. Esk Res. [Penicuick]	2·65
,,	Northampton	2·44	XIV.	Ayr, Cassillis House ...	..
,,	Cambridge, Beech Ho...	3·23	,,	Glasgow, Queen's Park.	2·84
,,	Wisbech, Bank House..	2·35	XV.	Islay, Gruinart School..	2·81
IV.	Southend	..	XVI.	St. Andrews, Newton Bk	3·57
,,	Harlow, Sheering	3·61	,,	Balquhidder, Stronvar..	3·90
,,	Rendlesham Hall	2·91	,,	Dunkeld, Inver Braan..	5 05
,,	Diss	3·10	,,	Dalnaspidal H.R.S. ...	5·28
,,	Swaffham	2·76	XVII.	Keith H.R.S.	3·57
V.	Salisbury, Alderbury...	3·21	,,	Forres H.R.S.	1·62
,,	Warminster	3·33	XVIII.	Strome Ferry H.R.S....	4·26
,,	Calne, Compton Bassett	2·47	,,	Lochbroom	3·69
,,	Ashburton, Holne Vic..	4·08	,,	Tain, Springfield.....	2 43
,,	Holsworthy, Clawton...	2·42	,,	Loch Shiel, Glenaladale	5·93
,,	Hatherleigh, Winsford.	3·27	,,	Invergarry	3·39
,,	Lynmouth, Glenthorne.	3·08	XIX.	Lairg H.R.S.	4·75
,,	Probus, Lamellyn	3·18	,,	Forsinard H.R.S.	3·41
,,	Wincanton, Stowell Rec.	3·09	,,	Watten H.R.S.	1·83
,,	Wells, Westbury.....	2·97	XX.	Dunmanway, Coolkelure	3·66
VI.	Bristol, Clifton	3·26	,,	Fermoy, Gas Works ...	3·13
,,	Ross	2·00	,,	Tralee, Castlemorris ...	2·99
,,	Wem, Sansaw Hall.....	2·28	,,	Tipperary, Henry Street	2·49
,,	Cheadle, The Heath Ho.	2·02	,,	Newcastle West	2·39
,,	Worcester, Diglis Lock	2·70	,,	Miltown Malbay.....	2·31
,,	Coventry, Coundon	2·40	,,	Corofin	...
VII.	Melton, Coston	1·83	XXI.	Carlow, Browne's Hill..	2·39
,,	Ketton Hall [Stamford]	2·16	,,	Navan, Balrath	1·84
,,	Horncastle, Bucknall ...	1·49	,,	Mullingar, Belvedere ...	1·67
,,	Mansfield, St. John's St.	1·98	,,	Athlone, Twyford	2·26
VIII.	Macclesfield, The Park.	1·94	XXII.	Galway, Quen 's Col....	2·10
,,	Walton-on-the-Hill.....	1·57	,,	Clifden, Kylemore	5·20
,,	Lancaster, South Road.	2·52	,,	Crossmolina, Enniscoe..	3·65
,,	Broughton-in-Furness ..	...	,,	Carrick-on-Shannon ...	2·33
IX.	Wakefield, Stanley Vic.	1·45	XXIII.	Dowra	...
,,	Ripon, Mickley	2·74	,,	Rockcorry.....	...
,,	Scarborough.....	1·93	,,	Warrenpoint	1·57
,,	East Layton [Darlington]	3·56	,,	Newtownards	1·65
,,	Middleton, Mickleton ..	4·07	,,	Belfast, New Barnsley..	2·88
X.	Haltwhistle, Unthank..	2·45	,,	Cushendun	2·03
,,	Shap, Copy Hill	3·10	,,	Bushmills	2·27
XI.	Llanfrechfa Grange	3·71	,,	Stewartstown	1·94
,,	Llandovery	3·16	,,	Buncrana	2·62
,,	Castle Malgwyn	2·39			

MAY, 1885.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32° In shade.	No. of Nights below 32° On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·63	+ ·71	·39	21	19	73·8	28	31·1	8	1	7
II.		Maidstone (Hunton Court)...	3·36	+ 1·34	·55	28	17	...	...	...	...	...	...
,,		Strathfield Turgiss	2·45	+ ·77	·55	21	18	68·3	28	30·2	12	2	7
III.		Hitchin	2·51	+ ·52	·61	21	16	68·0	28	31·0	7*a*	2	...
,,		Banbury	2·48	+ ·35	·54	25	17	70·5	27	29·5	8	3	...
IV.		Bury St. Edmunds (Culford)	3·17	+ 1·27	·43	25	21	79·0	28	30·0	7*b*	6	...
,,		Norwich (Cossey)	3·15	+ 1·34	·48	28	19	77·0	28	28·2	15	5	7
V.		Weymouth(LangtonHerring)	2·73	...	·85	21	20	...	...	...	...	...	...
,,		Barnstaple.....	3·21	+ 1·11	·67	19	17	69·0	28	41·0	7*c*	...	...
,,		Bodmin	3·17	+ ·33	·76	21	25	65·0	31	36·0	7*d*	0	7
VI.		Stroud (Upfield)	2·56	+ ·26	·51	21	23	75·0	28	32·0	7	1	...
,,		ChurchStretton(Woolstaston)	2·39	·00	·25	9*e*	22	65·0	27	33·0	7, 8	0	6
,,		Tenbury (Orleton)	3·40	+ ·97	·58	5	24	66·8	28	28·6	8	5	9
VII.		Leicester	2·49	...	·55	21	20	71·7	28	31·7	8	2	27
,,		Boston	1·67	— ·10	·32	5	19	73·0	28	32·0	8	1	...
,,		Grimsby (Killingholme).....	1·93	+ ·28	·29	1	22	72·0	28	32·0	8	0	...
,,		Hesley Hall [Tickhill].....	1·67	...	·30	3	18	75·0	28	29·0	12	4	...
VIII.		Manchester (Ardwick).....	1·68	— ·55	·24	23	19	69·0	27*f*	35·0	8	0	...
IX.		Wetherby (Ribston Hall) ...	3·09	+ 1·27	·49	22	14	...	...	...	...	...	...
,,		Skipton (Arncliffe)	3·89	+ ·77	·63	3	22	...	...	...	...	...	...
X.		North Shields	2·75	+ ·90	·37	20	22	71·0	28	29·5	7	5	...
,,		Borrowdale (Seathwaite).....	6·30	— ·68	1·15	20	23	60·1	28	28·5	7	...	...
XI.	WALES.	Cardiff (Ely).....	3·77	+ 1·17	·85	19	23	...	...	...	...	...	...
,,		Haverfordwest	3·41	+ ·72	·70	20	16	64·0	26*g*	28·5	11	4	8
,,		Plinlimmon (Cwmsymlog) ...	2·82	...	·40	1	19	...	...	...	...	...	...
,,		Llandudno.....	1·08	— ·54	·26	10	11	64·5	26	36·8	7	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	2·06	— ·47	·38	20	15	60·4	28	30·0	8*d*	4	...
,,		Jedburgh (Sunnyside).....	2·58	+ ·79	·53	1	15	64·0	26	28·0	12	6	...
XIV.		Douglas Castle (Newmains)	2·82	+ ·48	·71	1	16	...	...	...	..	...	...
XV.		Lochgilphead (Kilmory).....	3·11	+ ·35	·42	27	21	...	...	...	...	...	...
,,		Oban (Craigvarren)	2·39	...	·35	21	17	60·7	26	31·0	7	2	...
,,		Mull (Quinish).....	2·91	...	·43	27	19	...	...	...	...	...	...
XVI.		Loch Leven Sluices	3·90	+ 1·61	·80	21	16	...	...	...	...	...	...
,,		Arbroath	2·98	+ 1·21	·58	20	17	63·0	29	32·0	12	1	...
XVII.		Braemar	4·62	+ 2·20	·69	20	28	59·8	28	27·3	12	10	14
,,		Aberdeen	3·84	...	·86	9	23	62·0	28	30·0	12	3	...
XVIII		Skye (Sligachan)	...	...	...	...	...	...	...	...	...	...	...
,,		Culloden	2·96	+ 1·18	...	...	...	64·0	28	31·0	6*d*	2	13
XIX.		Dunrobin	3·47	...	·59	20	22	60·0	28	30·0	12	2	...
,,		Orkney (Sandwick)..... ..	1·70	— ·17	·36	8	22	60·5	28	32·5	7, 9	0	8
XX.	IRELAND.	Cork (Blackrock)	3·29	+ 1·13	·59	19	22	69·0	12	31·0	7	2	...
,,		Dromore Castle	4·33	...	·50	2*f*	19	60·0	31	31·0	13	...	...
,,		Waterford (Brook Lodge) ...	2·85	...	·63	19	24	63·0	31	31·0	8	1	19
,,		Killaloe	...	..	...	...	...	...	...	...	...	...	...
XXI.		Portarlington	2·04	+ ·19	·46	20	24	61·5	26	31·0	6	...	1
,,		Dublin (FitzWilliam Square)	2·53	+ ·81	·49	19	23	64·5	28	32·7	7	0	6
XXII.		Ballinasloe	2·09	— ·32	·35	19	24	65·0	31	29·0	7	4	...
XXIII		Waringstown	1·65	— ·46	·37	23	16	66·0	25	29·0	6, 7	3	6
,,		Londonderry (Creggan Res.).	3·24	...	·37	8	26	...	...	...	...	...	...
.		Omagh (Edenfel)	2·39	+ ·04	·32	23	25	65·0	16*h*	28·0	7	6	...

a And 11. *b* And 11, 12, 13, 14. *c* And 19. *d* And 12. *e* And 25. *f* And 28. *g* And 31. *h* And 27.

+ Shows that the fall was above the average ; — that it was below it.

METEOROLOGICAL NOTES ON MAY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—An unsettled month, with low temp. Cold winds and storms, and frosts at night prevailed until the last few days; altogether the coldest May remembered. Growth of all kinds checked, keep for stock very scarce, and everything remarkably backward. TS on 3rd and 17th, with H on the latter day. First swift seen on 1st; first pheasant hatched on 9th; young frogs seen on 15th; corn-crake heard on 25th; orange tip butterfly flying on 26th, and large white butterfly on 28th; wild strawberry in flower on 2nd, lilac on 6th, mountain ash on 10th, horse-chestnut on 13th, may on 14th, laburnum on 17th, oak in leaf on 10th.

BANBURY.—Mean temp. 48°·3, 4° 0 belowthe average. Upon the whole a favorable month and not much damage done by frost. Hawthorn abundantly blossoming at the end of the month, but petals much touched by frost in low situations near water, and having a singularly shabby appearance. Slight S on 7th and 8th, T and L on 3rd, T on four other days, H on one day.

CULFORD.—The month was generally stormy, and the nights were as a rule cold. H with distant T occurred several times.

LANGTON HERRING.—A cold ungenial month. Mean temp. 2°·6 below the average of 13 years; and max temp. the lowest in May during 14 years, with the exception of 1877. The highest min. also was low, and from the 1st to the 25th, the temperature fell every night to or below 45°. Dense fogs occurred on the 25th and 26th, and foggy weather was experienced on the following four days; T on 3 days, and solar halos on 3 days.

BODMIN.—A cold ungenial month. Mean temp. 52°·0.

STROUD.—A cold month, and a very backward season, T and L on 10th and 13th. H storms on 22nd.

WOOLSTANSTON.—A cold month; mean temp. 47°·0. Apple trees show an unusual amount of blossom, giving promise of a magnificent crop. T on 3rd and 14th.

ORLETON.—A very cold and stormy month with frequent falls of R; till the 24th the weather was very cold, the max. temp. never rising to 60°·0; the remainder of the month was warmer, but not equal to the average; the mean temp. for the whole month was more than 4°·0 below the average of 24 years, and about 0°·6 below that of 1879. Pressure was lower than usual, but the fluctuations were not great. There was much blossom on all fruit trees, but later than usual. Distant T was heard on the 3rd. A fall of S covering the ground occurred on the night of the 5th.

BOSTON.—The weather was very changeable, the range of temp. being 41°·0. There were some days with fine weather, sunshine and mild temp., and others bitterly cold, with H and S; T and L also occurred. The generally ungenial weather with low temp., R and frosts, coming after the fine weather at the end of April, was anything but beneficial to vegetation, and wheat, especially on poor and heavy lands began to turn yellow and look sickly; the warmer weather and showers at the end of the month did much to revive vegetation generally.

KILLINGHOLME.—A fine month, but with many frosty nights; crops of all kinds giving good promise. T on 16th, 21st, and 29th.

MANCHESTER.—The month was cold for the season; although the temp. here did not fall below 35°, there were hard frosts in the country around this city; there were a few genial days in the last week, when the temp. rose to 69°.

NORTH SHIELDS.—TSS on 8th, 21st, 22nd and 25th and T on 16th and 29th. S and H on 7th and 10th.

WALES.

HAVERFORDWEST.—The month commenced wet and unsettled; and was very bleak and cold with sharp night frosts up to the 18th; the last week was much warmer and more genial. TSS on 3rd and 9th. Oak in leaf on 20th, ash only commencing to unfold, white-thorn in blossom on 30th. A great promise of hay. Sharp TS on 3rd; TS on 9th.

LLANDUDNO.—A dry bright month with ample sunshine (183 hours); but mean temp. no less than 4°·0 below the average, owing in a measure possibly to the unusual number of icebergs in the Atlantic. The daily and total range of temp. were considerably below the average, and there was no frost.

SCOTLAND.

CARGEN.—The coldest May experienced since observations were commenced 25 years ago; mean temp. 46°·0, 4°·9 below the average; the lowest means for the month previously observed are 48°·9 in 1866, 46°·8 in 1869, and 48°·9 in 1883. Vegetation in a very backward state, few oaks being in leaf and still fewer ashes; the oak and ash have not before been observed coming into leaf so nearly at the same time, the oak, in this district, being generally speaking about ten days or a fortnight before the ash. T on six days, L on one, S and H on one.

JEDBURGH.—The weather was cold and ungenial, and though the rainfall exceeded the average for the month, the frequent cold winds soon dried it up, and little or no interruption was caused to country work except for a few days at the beginning of the month. Fruit blossom was abundant and as it escaped the frost, a good crop is hoped for. S on 5th, H on 6th, 9th and 10th. T on 7th, 10th, 15th and 16th. L on 10th and 16th.

OBAN.—A decidedly cold May, with a preponderance of N. winds, and a frequency of light rains. Vegetation very backward, owing to the cold, and green crops scarcely through the ground. On the 22nd and 27th, there were notable examples of white cloud fog which came up from the Atlantic and remained hanging over the sea for many hours, that of the 22nd being dispelled by northerly winds, that of the 27th being driven and succeeded by a strong gale from the S.W. T and L on 19th.

QUINISH.—A very cold, backward month from first to last.

BRAEMAR.—More or less S fell on nine days.

ABERDEEN.—The weather throughout the month was very wet and unsettled, the rainfall being two inches above the average; a severe S storm occurred in the early morning of the 10th; H on four days.

CULLODEN.—The early part of the month was cold, and there were late frosts; pastures made little, and in many places no advance; during the last week the weather was more genial.

IRELAND.

DROMORE.—The month was very cold with plenty of R; not much vegetation.

WATERFORD.—The month was cold and ungenial, the late frosts nipping early potatoes, but fruit blossom was most profuse. T and H showers occurred on several days, and on 21st a house was struck, and a tree split by L; on 8th heavy H fell, some of the stones being $\frac{3}{4}$ in. long, and $\frac{1}{2}$ in. across. S.W. gale on 28th and 29th.

DUBLIN.—For the most part a cold, showery month. Up to the 24th there was a remarkable and persistent deficit of temp. associated with a prevalence of polar winds, chiefly from N.W., and frequent H showers. The coldness of the weather was probably due to the melting of S and ice in Russia and the Baltic on the one hand, and on the other to the presence of vast ice-fields in the Atlantic as far south as Lat. 44°, and as far east as Long. 46° The distribution of cold and warmth during the month was similar to that observed in April—first came a long cold period, and then a sudden change to warmer

weather; but in May the max. temp. in shade (64°·5) fell short of the max, in April (66°·1) by 1°·6. At 2 p.m. on 17th, an exceptionally violent downpour of H occurred. TSS with H on 2nd, severe H storms on 10th, and L in the evening; fog on 20th. The mean temp. (47°·4) was 3°·5 below the average, the month being colder than any previous May for at least 20 years, the mean temp. of May 1869 (47°·5), and that of May, 1879 (47°·6) being the nearest. Mean humidity 76; mean amount of cloud 5·7; prevailing winds W., N.W. and S.W.

WARINGSTOWN—The latest spring remembered; foliage not much more forward at the close of the month than it usually is at the commencement.

EDENFEL.—The weather of the month, except a few days at the beginniug and end, was cold, wintry and wet. S on 6th, and H and sleet almost daily from thence to the 23d·

ATLANTIC TIDES AS STORM WARNINGS.

To the Editor of the Meteorological Magazine.

SIR,—Referring to Mr. Brenan's letter in your last number, permit me to remark that it appears to me that the Hebrideans, for lack of a mercurial barometer, have been in the habit of using an aqueous one to enable them to forecast cyclonic disturbances.

If from any cause the atmospheric pressure be lightened over a limited area of any body of water, the surrounding heavier air will force the water to rise in the limited area, just as it does in a common pump when the piston lifts up the pressing atmosphere inside the pump barrel. Within the cyclonic circuit the atmospheric pressure is less than outside, consequently the sea-surface embraced by the cyclone will rise in proportion to the difference of pressures; and so therefore as the cyclonic disturbance of balance travels eastward, overshadowing the Western Isles, so certainly will the sea-surface rise above the normal. The Islesmen of the past, not being in possession of artificial barometers, have ingeniously made use of the only substitute available—a natural one.

The moral of the matter is this. Instead of longer waiting for records of tides, let the Islesmen of Scotland and Ireland get, or be furnished with, good barometers, which will inform them quite as well as the sea-level regarding the diminution of atmosperic pressure.

As I have the pen in hand, excuse my adverting to what seems to me an unfortunate perversion of phrases. It is well known that within the area of a cyclone the air ascends, and, rising higher than the surrounding regions, flows over into them. Yet ever and anon we are told that an area of *depression* is travelling over certain districts. It may be explained that a depression of the mercury in the barometer is what is meant. But that is never said, and to most people the expression will convey the impression that it is the air that is alluded to; as they observe the air travelling, whilst the barometer continues to hang on its peg.

HENRY MUIRHEAD.

Cambuslang, May 18th, 1885.